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ABSTRACT

Three major themes distilled from a review and analysis of research on learning from interactive video are discussed in this paper: (1) interactive video as an instructional delivery system, including research on instructional effectiveness, cost effectiveness, and instructor/learner attitudes; (2) principles of learning applied to interactive video; and (3) the limitations of current studies. A proposed agenda for further research includes codifying the attributes of interactive video, examining research on other media, and investigating the instructional environment. It is recommended that researchers focus on generalizable results and extend the role of formative evaluation in order to make future research activities more useful and efficient. A 35-item bibliography is included. (MES)

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Introduction

Microcomputer-controlled interactive videodiscs provide a powerful and flexible instructional medium. Development of effective applications of this medium must be guided by a rigorous research into the nature of the medium and the forms of presentation most appropriate for particular subject matter, learners, and educational settings.

Two major themes emerge from a review and analysis of research on learning from interactive video: (1) interactive video as an instructional delivery system; and (2) research on principles of learning using interactive video as the instructional medium of delivery. This paper will discuss each of these themes, then present suggestions for future areas of research. The bibliography contains a listing of all articles that were reviewed. Several of these articles will be cited as specific examples of the major themes.

Research on interactive video as an instructional delivery system

1. Is interactive video as effective or more effective than other instructional delivery systems?

Most research involving interactive video has addressed this question. Representative studies include the U. S. Army Signal Center studies (Ketner, 1982), which found no advantage to using videodisc simulations over actual equipment to train satellite ground station technicians, and the WICAT introductory college Biology study (Bunderson, Olsen, & Baillio, 1981), which found significant knowledge gains and time savings compared to traditional lecture methods.

2. Is the use of interactive video as an instructional delivery system more time and/or cost effective than other media?

Research on this topic by the military and the WICAT study (Bunderson et. al., 1981) previously mentioned generally report that interactive videodisc-based instruction achieved the same or better results in less time than other methods, and thus was cost-effective.

3. Are the attitudes of the instructor and/or learner affected by the use of interactive video as the instructional delivery system?

Attitude surveys, usually conducted in conjunction with other types of effectiveness measurements, generally report significantly more positive attitudes toward learning from interactive video than from other methods by both students and instructors. Attitude gains are particularly striking with younger learners.

Research on principles of learning applied to interactive video

Few studies investigating principles of learning using interactive video as the instructional medium have been reported. Researchers investigated the nature of feedback, types of interaction, group versus individual viewing, and learner control versus program control, often as part of larger studies comparing interactive video to other media of instruction. The Open University study of control of learning (Laurillard, 1984), which found that students watched video presentations for shorter periods and interrupted more frequently when offered a menu of options at the end of each instructional segment, is typical.

Limitations of current studies

Most of the research literature on interactive video addresses the question of interactive video as an effective instructional delivery system. Results of this research have limited generalizability, and the results are difficult to replicate. A major limitation preventing replication and the development of more general understanding of interactive video is the large number of variables, such as different subject matter, instructional strategy, prior knowledge and experience of the learner, which are difficult to control for.

An additional limitation is that many of the studies used videotape as the interactive medium. Many educators feel that access time of videotape is too slow to make interactivity effective, although we were not able to identify any studies which specifically addressed this question.

A proposed agenda for further research

1. Codifying the attributes of interactive video

In interactive video, the whole is not only more than the sum of its parts but is in fact a completely new and unique delivery system. The "grammar" of interactive video, that is, the ways in which interactive video materials can be organized and manipulated, should be more completely

specified. The work of Gavriel Salomon (1983) on codifying the grammar of instructional television would serve as an appropriate model for this undertaking.

Further research is needed on questions such as:

- What learning tasks best lend themselves to this type of delivery?
- Should the unit be learner controlled, instructor controlled, or program controlled?
- If a unit is learner controlled, how much freedom should be given to the learner?
- What types of questioning techniques are appropriate?
- What types of information retrieval systems should be used?
- How does use of a specific characteristic of text, graphics, audio, or video (for example: pacing of video, animation versus live action, graphics overlay, audio over still frame) influence the effectiveness of other characteristics with which it is used? How does it's use influence the effectiveness of the overall interactive video presentation?
- What is the appropriate balance between computer and video components?

2. Examining research on other media

In codifying the attributes of interactive video, researchers should recognize that interactive video, although new and unique, shares many features with instructional film and instructional television on the one hand, and with computer-based instruction on the other. A detailed examination of the research literature on learning from other visual media, particularly film and (non-interactive) instructional television, should be carried out, in order to identify those features of video presentations (e.g. zooming, inserts, splitscreen, closeups) which are most directly related to increased learning when used in non-interactive video or film. Studies of the use of these same features in the context of interactive videodisc should then be carried out, in order to validate their effectiveness in an interactive environment. A similar examination of the research literature on computer-based instruction should be conducted.

3. Investigating the instructional environment

More attention should be paid to the instructional environment in which interactive videodisc-based learning takes place. Very different results may be obtained from the same videodisc materials in different settings. Aspects of the instructional environment which should be investigated include:

- What instructor styles are most appropriate for particular subject matter or particular learners?

- What is the optimal viewing audience size -- individual, small group, large group? Does it vary with content and instructional strategy?
- What is the optimal design of an interactive video laboratory.?
- What is the effect on learning of the presence or the absence of auxiliary materials ? How are auxiliary materials used in the environment?
- What differences in learning occur between a group in which peer interaction is encouraged and a group in which peer interaction is discouraged?

General considerations in planning future research efforts

We now present two general suggestions for making future research activities more useful and more efficient.

1. Focusing on generalizable results

Those attributes of effective interactive videodisc presentations which are generalizeable, not subject-specific or presentation-specific, need to be identified. This can be achieved through replication of selected studies using videodisc materials dealing with different subject matter, or by using the same materials in different settings.

2. Extending the role of formative evaluation

Formative research should go hand in hand with production of videodisc materials. Such research should be conducted and reported quickly enough so that the results can guide further production. Producers should include additional post-production (for re-shooting materials or additional editing) funds in budgets, or increase production budgets so that several approaches to the same material can be produced. All alternative versions could then be mastered on an inexpensive check disc and evaluated. The relatively slight increase in production costs could result in a much more effective final product.

Summary and Conclusions

Interactive video holds great promise as an instructional tool. Systematic research is required, however, if interactive video is to achieve its full potential and contribute to improved teaching and learning. It is hoped that this paper will contribute to an understanding of current research on videodisc-based learning and provide a context for determining a future research agenda.

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